**Amendment to the Claims**

In the Claims:

Please amend Claims 1, 3-4, 10-11, 16, 19, 21-30, 34-35, 38 and 41 as follows::

1. (Currently Amended) A method for suppressing a contribution from flowing blood to a signal used for magnetic resonance imaging (MRI) of each of a plurality of slices at a site in a patient, within a predefined repetition time, comprising the steps of:

(a) applying one of a non-selective inversion radio frequency (RF) pulse and a selective inversion RF pulse, followed by the other of the non-selective inversion RF pulse and the selective inversion RF pulse, said selective inversion RF pulse simultaneously inverting a magnetization for all of the plurality of slices to be imaged at the site within the predefined repetition time;

(b) next, waiting a predefined inversion time calculated as a function of a number of slices to be imaged at the site within the predefined repetition time, wherein the predefined inversion time is determined so that each application of a sequence of RF pulses and magnetic field gradient pulses to read out a signal for imaging each successive selected single slice from the plurality of slices occurs at a time when magnetization of the flowing blood is substantially zero, wherein the signal for imaging each successive selected slice is acquired while the magnetization of the flowing blood is substantially zero for said slice;

(c) next, executing ~~a~~ the sequence of RF pulses and magnetic field gradient pulses to read out ~~a~~ the signal for imaging and displaying a selected single slice from the plurality of slices;

(d) then, waiting a predefined delay time calculated as a function of the number of slices to be imaged; and

(e) repeating steps (a) – (d) in order to image and display each of the plurality of slices in succession, within the predefined repetition time, thereby enabling a clear visual evaluation of anatomic structures and pathologic tissues of interest in each of the selected single slices for diagnostic purposes, since each successive selected single slice is imaged while the magnetization of the flowing blood is substantially zero.

///

///

///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

2. (Original) The method of Claim 1, further comprising the step of storing the signal read out for each successive slice to enable a discrete image of each successive slice to be displayed.

3. (Currently Amended) The method of Claim 1, wherein ~~the predefined inversion time and~~ the predefined delay time ~~are~~ is determined so that the sequence of RF pulses and magnetic field gradient pulses are applied to read out the signal for imaging each selected single slice at a time when magnetization of the flowing blood is substantially zero.

4. (Currently Amended) The method of Claim 1, wherein the sequence of RF pulses and magnetic field gradient pulses executed to read out ~~a~~ the signal for imaging comprises a fast spin-echo sequence.

5. (Original) The method of Claim 1, wherein said selective inversion RF pulse and said non-selective inversion RF pulse are adiabatic inversion RF pulses.

6. (Original) The method of Claim 1, wherein said non-selective inversion RF pulse is a rectangular pulse.

7. (Original) The method of Claim 1, wherein step (c) begins in synchronization with a selected phase of a cardiac cycle of the patient.

8. (Original) The method of Claim 1, wherein the plurality of slices includes at least one artery conveying the flowing blood through the site.

9. (Original) A memory medium on which machine executable instructions are stored for carrying out the steps of Claim 1.

///

///

///

///

///

///

///

///

///

///

///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

10. (Currently Amended) A method for multi-slice ~~double-inversion recovery~~ double inversion-recovery black-blood imaging for a patient, comprising the steps of:

(a) carrying out a double inversion-recovery procedure that includes the step of applying in rapid succession and without regard to order, a non-selective inversion radio frequency (RF) pulse and a selective inversion RF pulse, said selective inversion RF pulse being targeted to act on a slab comprising a plurality of slices;

(b) next, waiting a predefined inversion time calculated as a function of a number of slices to be imaged at the site during a predefined repetition time, wherein the predefined inversion time is determined so that each application of a sequence of RF pulses and magnetic field gradient pulses to read out a signal for imaging each successive selected single slice from the plurality of slices occurs at a time when magnetization of the flowing blood is substantially zero, wherein the signal for imaging each successive selected slice is acquired while the magnetization of the flowing blood is substantially zero for said slice;

(c) next, executing ~~a~~ the sequence of RF pulses and magnetic field gradient pulses targeted at one slice in said slab in order to acquire a signal for use in ~~producing~~ displaying an image of said one slice, wherein a contribution to said image from flowing blood is substantially suppressed and wherein tissue surrounding the flowing blood is consistently visible in the image, thereby aiding evaluation of anatomic structures and pathologic tissues of interest in the one slice;

(d) then waiting a predefined post-signal acquisition delay time; and

(e) repeating steps (a) – (d) for each successive slice comprising the slab, until signals have been acquired for all of the plurality of slices comprising the slab during a predefined repetition time, so that suppression of the contribution from flowing blood to the image of each of the successive slices comprising the slab is achieved, thereby aiding the evaluation of anatomic structures and pathologic tissues of interest in each of the successive slices comprising the slab.

11. (Currently Amended) The method of Claim 10, wherein ~~the predefined inversion time and~~ the post-signal acquisition delay time ~~are~~ is determined so that magnetization of flowing blood is substantially zero at a time when the signal is acquired for use in producing the image of each successive slice.

///

///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

12. (Original) The method of Claim 10, wherein the predefined inversion time and the post-signal acquisition delay time are determined so that magnetization of flowing blood is approaching zero at a time when the signal is acquired for use in producing the image of each successive slice.

13. (Original) The method of Claim 10, wherein the plurality of slices are disposed at a location in a patient's body where the flowing blood is flowing through at least one artery.

14. (Original) The method of Claim 10, further comprising the step of displaying a discrete image for a selected slice from the plurality of slices for which signals were acquired, using the signal that was acquired for the selected slice.

15. (Original) The method of Claim 14, wherein the sequence of RF pulses and magnetic field gradient pulses targeted at one slice in said slab comprises a fast spin-echo sequence.

16. (Currently Amended) The method of Claim 14, wherein said selective inversion RF pulse and said non-selective inversion RF pulse are adiabatic inversion RF pulses.

17. (Original) The method of Claim 14, wherein said non-selective inversion RF pulse is a rectangular pulse.

18. (Original) The method of Claim 14, wherein step (c) begins in synchronization with a selected phase of a cardiac cycle of the patient.

19. (Currently Amended) The method of Claim 10, wherein ~~a~~ the plurality of slices are imaged for each cardiac cycle of a patient.

20. (Original) A memory medium on which machine executable instructions are stored for carrying out the steps of Claim 10.

///

///

///

///

///

///

///

///

///

///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

21. (Currently Amended) A controller for generating a pulse sequence for multi-slice double inversion-recovery magnetic resonance imaging, said pulse sequence being repeated for acquiring a signal usable to image each of a succession of slices included in a slab, ~~said pulse sequence~~ comprising:

(a) a memory in which a plurality of machine executable instructions are stored; and

(b) a processor that is coupled to the memory and executes the machine executable instructions causing the pulse sequence to be generated, said pulse sequence being characterized by including:

(i) a double inversion pulse pair ~~including~~ generated to include in rapid succession, but without regard to order, a non-selective inversion radio frequency (RF) pulse and a slab-selective inversion RF pulse targeted at a slab comprising a plurality of slices;

(~~b~~ii) an inversion delay period calculated as a function of a number of slices to be imaged at the site, wherein the inversion delay period is determined so that during use of the pulse sequence, magnetization of the flowing blood is substantially zero at a time when the acquisition sequence of RF pulses and magnetic field gradient pulses are applied to read out the signal usable for producing an image of each successive slice of the slab, wherein the signal for imaging each successive slice is acquired while the magnetization of the flowing blood is substantially zero for said slice;

(~~c~~iii) an acquisition sequence of RF pulses and magnetic field gradient pulses generated and applied for spatial encoding and read out of a signal usable for producing an image of a slice; and

(~~d~~iv) a post-signal acquisition delay period that is applied before the pulse sequence is repeated to acquire a signal for imaging a successive slice of the slab and for displaying an image of the successive slice of the slab in order to aid in visually evaluating anatomic structures and pathologic tissues of interest.

///

///

///

///

22. (Currently Amended) The ~~pulse sequence~~ controller of Claim 21, wherein ~~the inversion delay period and~~ the post-acquisition delay period ~~are~~ is determined so that during use of the pulse sequence, magnetization of flowing blood is substantially zero at a time when the acquisition sequence of RF pulses and magnetic field gradient pulses are applied to read out the signal usable for producing ~~an~~ the image of each successive slice of the slab.

23. (Currently Amended) The ~~pulse sequence~~ controller of Claim 21, wherein the inversion delay period and the post-acquisition delay period are determined so that during use of the pulse sequence, the magnetization of flowing blood is approaching zero at a time when the acquisition sequence of RF pulses and magnetic field gradient pulses are applied to read out the signal usable for producing ~~an~~ the image of each successive slice of the slab.

24. (Currently Amended) The ~~pulse sequence~~ controller of Claim 21, wherein the inversion delay period is determined as a function of a number of slices in the slab that are to be imaged during a predefined repetition time.

25. (Currently Amended) The ~~pulse sequence~~ controller of Claim 21, wherein the acquisition sequence of RF pulses and magnetic field gradient pulses comprises a fast spin-echo sequence.

26. (Currently Amended) The ~~pulse sequence~~ controller of Claim 21, wherein said slab-selective inversion RF pulse and said non-selective RF pulse are adiabatic inversion RF pulses.

27. (Currently Amended) The ~~pulse sequence~~ controller of Claim 21, wherein the said non-selective inversion RF pulse is a rectangular pulse.

28. (Currently Amended) The ~~pulse sequence~~ controller of Claim 21, wherein said pulse sequence is synchronized with a cardiac rhythm of a patient to whom the pulse sequence is applied.

///

///

///

///

///

///

///

///

///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

29. (Currently Amended) A system for multi-slice ~~double inversion recovery~~ double inversion-recovery black-blood imaging, comprising:

(a) an MRI apparatus adapted for producing an image of a site; and

(b) a computer coupled to the MRI apparatus to control it, said computer including:

(i) a memory in which machine instructions are stored; and

(ii) a processor coupled to the memory, said processor executing the machine instructions to control the MRI apparatus to carry out a sequence of operations, including:

(1) carrying out a double inversion-recovery procedure that includes the step of applying in rapid succession and without regard to order, a non-selective inversion radio frequency (RF) pulse and a selective inversion RF pulse, said selective inversion RF pulse being targeted to act on a slab comprising a plurality of slices;

(2) next, waiting a predefined inversion time calculated as a function of a number of slices to be imaged at the site during the predefined repetition time, determined so that magnetization of flowing blood is substantially zero at each successive time when the signal is acquired for use in producing an image of a successive slice, wherein the signal for imaging each successive slice is acquired while the magnetization of the flowing blood is substantially zero for said slice;

(3) next, executing a sequence of RF pulses and magnetic field gradient pulses targeted at one slice in said slab in order to acquire a signal for use in producing an image of said one slice, wherein a contribution to said image from flowing blood is substantially suppressed and wherein tissue surrounding the flowing blood is consistently visible in the image;

(4) then, waiting a predefined post-signal acquisition delay time; and

(5) repeating steps (1) – (4) for each successive slice comprising the slab, until signals have been acquired for all of the plurality of slices comprising the slab during a predefined repetition time.

///

///

///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

2848-3867-4644PT
UNIV0217-1-21\0217AM.doc

30. (Currently Amended) The system of Claim 29, wherein ~~the predefined inversion time and~~ the post-signal acquisition delay time ~~are~~ is determined so that magnetization of flowing blood is substantially zero at a time when the signal is acquired for use in producing the image of each successive slice.

31. (Original) The system of Claim 29, wherein the predefined inversion time and the post-signal acquisition delay time are determined so that magnetization of flowing blood is approaching zero at a time when the signal is acquired for use in producing the image of each successive slice.

32. (Original) The system of Claim 29, further comprising a display coupled to the processor, wherein the machine instructions further cause the processor to display a discrete image for a selected slice from the plurality of slices for which signals were acquired, using the signal that was acquired for the selected slice.

33. (Original) The system of Claim 29, wherein the machine instructions further cause the processor to image a plurality of slices for each cardiac cycle of a patient with which the system is used.

///
///
///
///
///
///
///
///
///
///
///
///
///
///
///
///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

34. (Currently Amended) A method for enabling visual evaluation of atherosclerotic plaque in a blood vessel of a patient, comprising the steps of:

(a) identifying a plurality of slices to be imaged at a site, said plurality of slices being within a plane that is generally transverse to a longitudinal direction of the blood vessel;

(b) applying to the site one of a non-selective inversion radio frequency (RF) pulse and a selective inversion RF pulse, followed by the other of the non-selective inversion RF pulse and the selective inversion RF pulse, said selective inversion RF pulse simultaneously inverting a magnetization for all of the plurality of slices to be imaged at the site;

(c) next, waiting a predefined inversion time calculated as a function of a number of slices to be imaged at the site within a predefined repetition time, said predefined inversion time being determined so that the sequence of RF pulses and magnetic field gradient pulses are applied to read out the signal for imaging each selected single slice at each successive time when a magnetization signal for the flowing blood is substantially zero, wherein the signal for imaging each successive selected slice is acquired while the magnetization of the flowing blood is substantially zero for said slice;

(d) next, executing a sequence of RF pulses and magnetic field gradient pulses to read out a signal for imaging a selected single slice from the plurality of slices;

(e) next, waiting a predefined delay time calculated as a function of the number of slices to be imaged;

(f) repeating steps (b) – (e) to image each of the plurality of slices at the site in succession, within the predefined repetition time; and

(g) displaying selected slice images of the site, any atherosclerotic plaque in an artery of the patient at the site being clearly visible in the transverse slice images that are displayed, a contribution due to flowing blood being suppressed to more clearly visually display such atherosclerotic plaque in the artery.

35. (Currently Amended) The method of Claim 34, wherein the step of identifying ~~a~~ the plurality of slices to be imaged comprises the step of determining an index location for use as a reference when imaging the plurality of slices.

///

///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

36. (Original) The method of Claim 34, further comprising the step of acquiring a signal with at least one type of contrast weighting when carrying out the step of reading out the signal.

37. (Original) The method of Claim 36, wherein said at least one type of contrast weighting comprises at least one of a $T_1$ weighting, a proton density (PD) weighting, and a $T_2$ weighting.

38. (Currently Amended) The method of Claim 34, wherein ~~the predefined inversion time and~~ the predefined delay time ~~are~~ is determined so that the sequence of RF pulses and magnetic field gradient pulses are applied to read out the signal for imaging each selected single slice at a time when a magnetization signal for the flowing blood ~~in~~ is substantially zero.

39. (Original) The method of Claim 34, wherein the step of displaying selected slices of the site enable visualization of one or more morphological conditions of any atherosclerotic plaque at the site, including:

(a) a lipid core in the atherosclerotic plaque;

(b) an intraplaque hemorrhage in the atherosclerotic plaque;

(c) necrosis in the atherosclerotic plaque;

(d) calcified tissue within the atherosclerotic plaque; and

(e) a ruptured fibrous cap on the atherosclerotic plaque.

///
///
///
///
///
///
///
///
///
///
///
///
///
///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

40. (Original) The method of Claim 34, wherein the step of identifying the plurality of slices to be imaged at the site comprises the steps of:

(a) to the site of the blood vessel, applying one of a non-selective inversion radio frequency (RF) pulse and a selective inversion RF pulse, followed by the other of the non-selective inversion RF pulse and the selective inversion RF pulse, said selective inversion RF pulse simultaneously inverting a magnetization for all of an initial plurality of slices to be imaged within the predefined repetition time;

(b) next, waiting a predefined inversion time that is calculated as a function of a number of slices to initially be imaged at the site within the predefined repetition time;

(c) next, executing a sequence of RF pulses and magnetic field gradient pulses to read out a signal for imaging a selected single slice from the plurality of slices to initially be imaged;

(d) then, waiting a predefined delay time calculated as a function of the number of slices to initially be imaged;

(e) repeating steps (a) – (d) to image each of the initial plurality of slices in succession, within the predefined repetition time; and

(f) processing signals read out to display images of slices initially imaged at the site, said images being used to further identify the position of the transverse slices.

///

///

///

///

///

///

///

///

///

///

///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

41. (Currently Amended) A method for black-blood angiography that enables visualization of blood vessels and lesions formed inside the blood vessels of a patient, comprising the steps of:

(a) identifying a plurality of slices to be imaged at a site within the patient, said plurality of slices being within a plane that is generally oblique to a longitudinal direction of the blood vessel;

(b) applying to the site one of a non-selective inversion radio frequency (RF) pulse and a selective inversion RF pulse, followed by the other of the non-selective inversion RF pulse and the selective inversion RF pulse, said selective inversion RF pulse simultaneously inverting a magnetization for all of the plurality of slices to be imaged at the site;

(c) next, waiting a predefined inversion time calculated as a function of a number of slices to be imaged at the site within a predefined repetition time<u>, said predefined inversion time being determined so that a sequence of RF pulses and magnetic field gradient pulses are applied to read out the signal for imaging a successive selected single slice at each successive time when a magnetization signal for the flowing blood is substantially zero, wherein the signal for imaging each successive selected slice is acquired while the magnetization of the flowing blood is substantially zero for said slice</u>;

(d) next, executing a sequence of RF pulses and magnetic field gradient pulses to read out a signal for imaging a selected single slice from the plurality of slices;

(e) next, waiting a predefined delay time calculated as a function of the number of slices to be imaged;

(f) repeating steps (b) – (e) to image each of the plurality of slices at the site in succession, within the predefined repetition time; and

(g) processing the plurality of slice images by an algorithm, producing an image displaying continuity of blood vessels so that the blood vessels are consistently dark, in contrast to tissue outside the blood vessels and any lesions inside the blood vessels.

42. (Original) The method of claim 41, wherein the algorithm of the step (g) comprises multiplanar reformation.

43. (Original) The method of claim 41, wherein the algorithm of the step (g) comprises minimal intensity projection.

///



LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314

44. (Original) The method of claim 41, wherein any lesion inside the blood vessel comprises one of an atherosclerotic plaque and a thrombus.





LAW OFFICES OF RONALD M. ANDERSON
600 - 108th Avenue N.E., Suite 507
Bellevue, Washington 98004
Telephone: (425) 688-8816 Fax: (425) 646-6314